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| ***Notice of Allowability*** | **Application No.**<br>10/681,646 | **Applicant(s)**<br>CHAVARRIA ET AL. | |
| | **Examiner**<br>Victor J. Taylor | **Art Unit**<br>2863 | |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--***

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *8 August 2003*.
2. ☒ The allowed claim(s) is/are *1-20*.
3. ☒ The drawings filed on *08 August 2003* are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

C.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
   1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   **Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 8
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

John Barlow
Supervisory Patent Examiner
Technology Center 2800

## DETAILED ACTION

### *Drawings*

1. The drawings were received on 8 August 2003. These drawings are approved.

### *Prior Art*

2. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

I. Art A of Ishikawa US 6,606,586 in class 703/005 is cited for the simulation monitoring a physical quantity at a given position in the analysis space with expressed by using Poisson's equation, and a Green's function and the Green's theorem and teaches equation substitution for unknown parameters in the equation see RP1 in figure 4. He teaches parameters for electrical conductivity and thermal conductivity K2 in figure 8. He further teaches expressing the simulation functions representing the physical quantities in line 60 of column 4 and discloses the potential boundary equation in column 10.

II. Art B of Shapiro et al., US 6,718,291 in class 703/002 is cited for the mesh free method for modeling 100 and engineering analysis of geometric models by implicit mathematical functions 110 for interpolation of boundary conditions 120 over the geometry in figure 1. He further teaches model implementation on computation computer devices for engineering analysis of problems with geometric data in line 55 of column 10 and teaches the equation matrix partial derivatives of composite implicit functions using the Jacobian transformation in lines 35-65 of column 14.

### *Allowable Subject Matter*

3. Claims 1-20 are allowed.

4. The following is an examiner's statement of reasons for allowance:

With regard to claim 1, The prior art of record does not suggest or disclose the claimed combination for determining a parameter of interest of a region of the earth most particularly the claimed method steps for "measuring at least one component of potential fields data at a plurality of locations over a region of interest including a subterranean formation of interest the said potential fields data selected from the magnetic data and the gravity data"...[and] in combination with steps for "determining an initial geophysical model of the region including the subterranean formation of interest"...[and] in combination with the peculiar claimed method steps for "the model estimating a value of the gravity data at said plurality of locations using a high order compact finite difference method"...[in] combination with steps for "determining a difference between the estimated value and the measured value of the measurements at the plurality of locations"...[and] with the steps for "updating the geophysical model of the region based on the difference"...[and] with the steps for "iteratively repeating steps c-e until the difference is less than a predetermined value" and "using the updated model to determine the parameter of interest" for using the high order compact finite difference method is not found in the cited art of record.

The prior art A of Ishikawa teaches the model ling using the simulation monitoring of a physical quantity at a given position in the analysis space expressed by using the Poisson's equation, and teaches using a Green's function and the Green's theorem and further teaches using the equation substitution for the unknown parameters in the equation see RP1 in figure 4. He further teaches using various parameters for electrical conductivity and thermal conductivity K2 in figure 8. He further teaches expressing the simulation functions representing the physical quantities in line 60 of column 4 and discloses the potential boundary equation in column 10.

The prior Art B of Shapiro et al., teaches the mesh free method for modeling 100 and teaches the engineering analysis of geometric models by using the implicit mathematical functions 110 for interpolation of the boundary conditions 120 over the geometry in figure 1. He further teaches the model implementation on the computation computer devices for the engineering analysis of problems using the geometric data in line 55 of column 10 and teaches the use of equation matrix partial derivatives of composite implicit functions and using the Jacobian transformation in lines 35-65 of column 14.

Therefore, the prior art Ishikawa and The prior art of Shapiro in combination or alone does not teach the present limitation of the claimed combination limitation.

Claims 2-11 are variously dependent on the allowed independent claim 1 and are allowed at least for the reason cited above.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

With regard to claim 12, The prior art of record does not suggest or disclose the claimed combination for determining a parameter of interest of a region of the earth most particularly the claimed method steps for "measuring at least one component of potential fields data at a plurality of locations over a region of interest including a subterranean formation of interest"...[and] in combination with steps for "determining an initial geophysical model of the region including the subterranean formation of interest"...[and] in combination with the peculiar claimed method steps for "the model estimating a value of the gravity data at said plurality of locations based on a forward model of gravity data using a high order compact finite difference method"...[in] combination with steps for "determining a difference between the estimated value and the measured value of the measurements at the plurality of locations"...[and] with the steps for "updating the geophysical model of the region based on the difference"...[and] with the steps for "iteratively repeating steps c-e until the difference is less than a predetermined value" and "using the updated model to determine the parameter of interest" for using the high order compact finite difference method is not found in the cited art of record.

The prior art A of Ishikawa teaches the model ling using the simulation monitoring of a physical quantity at a given position in the analysis space expressed by using the Poisson's equation, and teaches using a Green's function and the Green's theorem and further teaches using the equation substitution for the unknown parameters in the equation see RP1 in figure 4. He further teaches using various parameters for electrical conductivity and thermal conductivity K2 in figure 8. He further teaches expressing the simulation functions representing the physical quantities in line 60 of column 4 and discloses the potential boundary equation in column 10.

The prior Art B of Shapiro et al., teaches the mesh free method for modeling 100 and teaches the engineering analysis of geometric models by using the implicit mathematical functions 110 for interpolation of the boundary conditions 120 over the geometry in figure 1. He further teaches the model implementation on the computation computer devices for the engineering analysis of problems using the geometric data in line 55 of column 10 and teaches the use of equation matrix partial derivatives of composite implicit functions and using the Jacobian transformation in lines 35-65 of column 14.

Therefore, the prior art Ishikawa and The prior art of Shapiro in combination or alone does not teach the present limitation of the claimed combination limitation.

Claims 13-20 are variously dependent on the allowed independent claim 12 and are allowed at least for the reason cited above.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

## ***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor J. Taylor whose telephone number is 517-272-2281. The examiner can normally be reached on 8:00 to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow can be reached on 571-272-2863. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

6. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

VJT
19 April 2005

John Barlow
Supervisory Patent Examiner
Technology Center 2800